

this book will be found equally suitable for the middle forms of secondary schools. Containing, as it does, excellent descriptions of the mode of working in wind-mills, the steam engine, the internal combustion engine, hydraulic, steam, and internal combustion turbines, etc., it cannot fail to interest boys and to increase their interest in their physical studies. There is enough, but not too much, speculative matter included to stimulate the thoughtful reader. We can thoroughly recommend the volume as providing a useful addition to the ordinary school course.

An Introduction to the Physics and Chemistry of Colloids.

By E. Hatschek. (Text-Books of Chemical Research and Engineering.) Fourth edition, entirely rewritten and enlarged. Pp. xiv + 172. (London: J. and A. Churchill, 1922.) 7s. 6d. net.

MR. HATSCHEK's book is one of the best introductory text-books on the subject in any language, and is widely appreciated. The present edition has been rewritten and enlarged, and embodies much of the recent work on the subject. It should be in the hands of all students of chemistry, and for this reason it is much to be regretted that the price is not lower.

The Manufacture and Uses of Explosives, with Notes on their Characteristics and Testing. By Dr. R. C. Farmer. (Pitman's Technical Primer Series.) Pp. xii + 116. (London: Sir I. Pitman and Sons, Ltd., 1921.) 2s. 6d. net.

ALTHOUGH interest in the military applications of explosives has probably waned to a considerable extent in most countries, it is perhaps not generally realised what an important part these products of chemical invention play in the arts of peace. The name of the author of this small book is sufficient to guarantee the accuracy of the information contained in it, and it is only necessary to state that Dr. Farmer has compressed into about a hundred small pages a surprising amount of up-to-date material. The style is easy, but the treatment is such that the book is far from being merely a "popular" account of the subject: it is a small encyclopaedia, which may be read with advantage by all students of chemistry as well as by those more directly interested in the manufacture and uses of explosives. The very important source of sulphur at Louisiana should have been mentioned on p. 37.

Directive Wireless Telegraphy: Direction and Position Finding, etc. By L. H. Walter. (Pitman's Technical Primer Series.) Pp. xii + 124. (London: Sir I. Pitman and Sons, Ltd., 1921.) 2s. 6d. net.

IT is now thirteen years since Bellini and Tosi read their paper on "A Directive System of Wireless Telegraphy" to the Physical Society of London. Although Marconi and Fleming had previously done good work on directive radio-telegraphy, it was this paper that first showed British physicists how directive signalling could be obtained by using a fixed aerial and only rotating a small coil of wire. The method, however, lay almost dormant until the war proved its great practical utility. Mr. Walter was one of the pioneers of the Bellini and Tosi system, and in the volume under notice a *résumé* is given of most of the useful practical information available. The author has utilised much of the theory recently published by the Bureau of Standards and by the Signal Corps of the

United States War Department. The mathematics given is of the most elementary description, and will be readily understood by every physicist and engineer. We can commend this book.

Fuel and Lubricating Oils for Diesel Engines. By W. Schenker. Pp. xii + 114. (London: Constable and Co., Ltd., 1921.) 15s.

THE title of this book is apt to convey a wrong impression, as its contents in the main are of a general character, and not specially devoted to Diesel engines. There are three sections, the first of which deals with the origin and preparation of various kinds of fuel oils, with special reference to the varieties which may be used for Diesel engines; the second section treats very briefly of lubricating oils; whilst the third consists of a description of the commercial tests applied to these oils. The book would have been of greater service to British consumers of oil had the author included a fuller account of the methods of testing and forms of specification used in this country instead of confining himself to Continental practice in these particulars. Thus Redwood's viscometer, the British standard instrument, is dismissed in a dozen lines, and Abel's flash-point apparatus is not mentioned. Descriptions of other appliances are sometimes too meagre, the bomb calorimeter being given only eleven lines, whilst a purifying apparatus, illustrated on p. 66, is entirely undescribed in the text. In spite of these drawbacks, however, the book contains much useful information of a practical kind. C. R. D.

The Wonder Book of Science. By J. H. Fabre. Pp. 287. (London: Hodder and Stoughton, Ltd., n.d.) 8s. 6d. net.

THE object of Fabre in writing the series of essays under notice was to impart general knowledge about things that are familiar to the eyes, though not necessarily to the understanding. The first seven essays deal with insect-life, and these are followed by a number on birds, on some of the facts of plant-life, on the various forms of water and the application of steam, on the elementary phenomena of electricity, etc. These essays, which touch on so many subjects, illustrate Fabre's method of arousing the interest of young people in the phenomena around them. In all, forty-eight essays are reproduced, but the name of the translator does not appear.

More Hunting Wasps. By J. H. Fabre. Translated by A. T. de Mattos. Pp. viii + 376. (London: Hodder and Stoughton, Ltd., n.d.) 8s. 6d. net.

THROUGH the energies of the late Alexander de Mattos a number of Fabre's most interesting studies in insect-life have been rendered accessible to the general reader in this country. The present volume consists of fourteen chapters, which complete the essays in the "Souvenirs Entomologiques" devoted to wasps. The remainder have already been translated in two earlier volumes entitled "The Hunting Wasps" and "The Mason Wasps." Two of the essays in this book, which form chaps. 2 and 10, have already appeared in previous translations, while the remainder are rendered in English for the first time. Most admirers of the writings of the French *savant* will welcome the appearance of this book and revel in the fascinating

stories of insect behaviour that are recorded in its pages. Fabre is admittedly a difficult writer to translate, and the charm of his diction only too readily escapes if too much freedom be exercised. Mr. de Mattos's task, therefore, has not been an easy one, but he has carried it out conscientiously and with evident care for accuracy.

A First Book of Applied Electricity. By S. R. Roget. (First Books of Science.) Pp. viii+143. (London: Macmillan and Co., Ltd., 1921.) 2s. 6d.

THE author has made a very successful attempt to give the elementary principles which underlie the useful applications of electricity and magnetism without worrying the reader with academical definitions and difficulties. The book has what we think is a great merit—namely, that it is entirely independent of the requirements of examinations. It is therefore more interesting than the ordinary treatise, and covers a much wider field.

It can be recommended to the general reader anxious to get an easily acquired, accurate, and useful knowledge of electrical matters. The ordinary student reading for examinations will also find it a useful introduction to more advanced treatises.

Perfumes, Essential Oils and Fruit Essences used for Soap and other Toilet Articles. By Dr. G. Martin. (Manuals of Chemical Technology.—X.) Pp. vii+138. (London: Crosby Lockwood and Son, 1921.) 12s. 6d. net.

DR. MARTIN's book is of a severely practical character; it contains much information in a very condensed form, and should be useful as a work of reference to those interested in the manufacture of the class of materials of which it treats. A large number of practical recipes is given. The section on analysis, occupying only four pages, is too brief to be of real value. No references to the literature are given beyond the mention of a few patents and a list of ten books on the subjects treated.

"*Power's*" *Practical Refrigeration.* Compiled by the Editorial Staff of *Power*. Pp. viii+283. (New York and London: McGraw-Hill Book Co., Ltd., 1921.) 10s. net.

THE practice of ammonia refrigeration, including a simple account of the theory and tables of useful constants, is discussed in this volume. A number of practical hints for users of refrigeration plant, written in a colloquial style, forms about half the book, which should be useful to persons in charge of such plant.

Chemistry of Pulp and Paper Making. By E. Sutermeister. Pp. vii+479+31 plates. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1920.) 36s. net.

THE chemical aspects of paper-making are dealt with in the volume under notice, the mechanical processes being described only in so far as they are necessary for an understanding of the chemistry. Although concerned chiefly with American practice, and less complete than the standard English treatises, the volume should be of service to chemists in paper-works laboratories. It is clearly written and well illustrated.

Letters to the Editor.

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The Directive Tendency of Elongated Bodies.

THIS letter deals with several topics, perhaps somewhat remotely related to one another, but all suggested by previous letters on the same general subject in *NATURE* of October 20, November 24, December 1, and December 22, 1921.

In my letter of December 22 it was suggested that Mr. Reeves's results might be explained by the peculiarities of the gravity field at the place where the experiments were made. The letter was written before Mr. Reeves's letter appeared and while I was under the impression that his experiments were all made at one place. The suggestion might be plausible as regards any one place, at least until measurements had been made there with an Eötvös balance, but would be highly improbable when applied to every one of the widely scattered places where Mr. Reeves made his tests.

Col. Grove-Hills in his letter in *NATURE* of November 24 directs attention to an important difference between the turning effect of the earth's field on an elongated body supported at its centre of gravity and the turning effect on a similar body when supported by flotation. He attributes quite undeserved credit to me, however, in stating that this matter is fully treated in my article in the September (1921) issue of the *American Journal of Science*. Only a very special case of the turning effect on a floating body is there treated, and that case is scarcely analogous to the one considered in recent issues of *NATURE*.

There are two kinds of forces acting on a floating body, namely, the force arising from the earth's gravity field, which is a body force, and the normal pressure of the fluid on the wetted surface. By well-known theorems concerning the transformation of surface integrals into volume integrals it may be proved that the effect of the fluid pressure may be replaced by the body force arising from the earth's field reversed and applied to a solid bounded by the wetted surface and by the free surface of the fluid extended in imagination into the floating body, the density of this solid being the same as that of the fluid. This theorem is proved in very elementary fashion in the ordinary theory, in which gravity is assumed to be constant in intensity and direction, but is equally true when gravity varies in intensity and direction from one part of the region considered to another.

In dealing with the turning effect on a floating body of the earth's field and of the fluid pressure, it is necessary to make some assumption regarding the depth to which the body is submerged; a natural assumption is that the body is submerged to such a depth that the downward pull of the earth's field is just balanced by the upward thrust of the fluid pressure or of the equivalent body force. Let us consider the case of an elongated body symmetrical about a vertical axis through the centre of mass of the body, and let us suppose the earth's field to be also symmetrical about the same axis; there is then no moment tending to turn the body about any horizontal axis. Several terms disappear from the general expression for the earth's field on account of the assumed symmetry, but those remaining represent the component of a force that turns the suspended elongated body about into the prime vertical for a normal field